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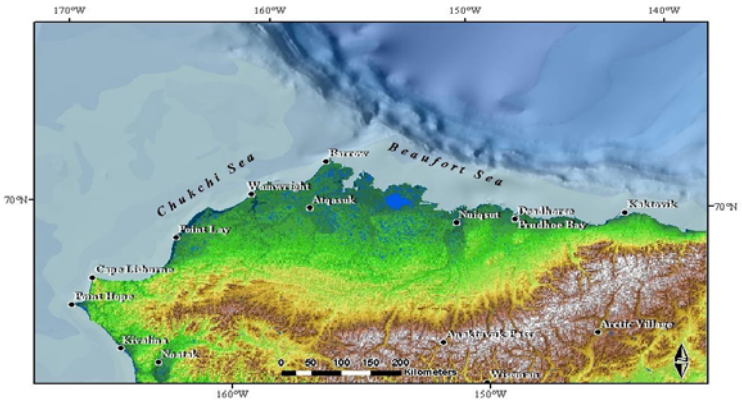
Engineer Research and Development Center

Barrow Storm Damage Reduction

Description

CHL, in support of the Alaska District, characterized the wind, wave, and water level climate and assessed storm impacts to provide design concepts for shore protection at Barrow, Alaska.

Issue



Storm events that cross the Chukchi Sea during the open-water season result in wave climates and storm surge that actively erode the coastline and threaten the communities of Barrow, Alaska. Design of shore protection at Barrow requires a thorough understanding of the wind, wave, surge, partial free ice coverage, and sediment transport climates. Both the short-term response (time scales of individual storm events) and long-term response (time scales on the order of the re-nourishment interval, years) must be accurately characterized.

Products

1. Shore protection design concepts and flood damage indicators for input to Beach-*fx* that will aid in the final storm protection design for the project site. 2. Wind and wave hindcasts for the open water months of the 20-year period from 1982 to 2002. 3. Hindcast of waves, storm surge, wave set-up and run-up for historical storm events occurring from 1954 through 2003. 4. Data set of waves, water levels and currents for the open water seasons of 2003 and 2004. These data were used for calibration and verification of the numerical models.

Supporting Technology

The deep-water wave hindcasts were produced utilizing WAM, a time dependent discrete spectral 3rd generation wave model that solves the action balance equation. The nearshore wave transformation was predicted with the spectral wave model STWAVE. The wind-driven currents and water level fluctuations, for storm and non-storm conditions, were simulated with ADCIRC, a two-dimensional depth-integrated hydrodynamic model. The beach profile response to waves, wave set-up and run-up were predicted with SBEACH.

Benefits

The design concepts and flood damage indicators will aid in the development of a cost-effective beach fill design to protect the infrastructure in and around Barrow, Alaska. The climate and storm hindcasts can be applied for future studies in the project region.

Sponsor

US Army Engineer District, Alaska.

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